Claims

1. Optical microelectromechanical structure (MEMS) comprising

- at least one optically transmissive layer (UTL)
- at least one intermediate layer structure (IL)
- at least one device layer (DL)

said intermediate layer structure (IL) facilitating one or more optical paths (OP) between said substantially optically transmissive layer (UTL) and said device layer (DL),

said intermediate structure layer (IL) defining the distance (d) between said optically transmissive layer (UTL) and said device layer (DL).

2. Optical microelectromechanical structure (MEMS) according to claim 1, wherein said intermediate layer structure (IL) comprises at least one electrically insulating layer.

3. Optical microelectromechanical structure (MEMS) according to claim 1 or 2, wherein said intermediate layer structure (IL) comprises a plurality of sub-layers.

4. Optical microelectromechanical structure (MEMS) according to any of the claims 1-3, wherein at least one of said sub-layers comprises an electrically insulating layer.

5. Optical microelectromechanical structure (MEMS) according to any of claims 1-4, wherein said intermediate layer structure (IL) comprises one unitary layer structure.

6. Optical microelectromechanical structure (MEMS) according to claim 5, wherein said single layer structure comprises a plate structure having at least one opening means forming part of said one or more optical paths (OP).

7. Optical microelectromechanical structure (MEMS) according to claim 5, wherein said at least one opening means comprises one opening forming part of said optical paths (OP).

8. Optical microelectromechanical structure (MEMS) according to claim 5, wherein said at least one opening means comprises a plurality of apertures (AP).

9. Optical microelectromechanical structure (MEMS) according to claim 5, wherein said at least one opening means comprises a plurality of apertures (AP) each forming part of one individual optical path (OP).

10. Optical microelectromechanical structure (MEMS) according to any of the claims 1-3, wherein said intermediate layer structure (IL) comprises a plurality of layer structures.

11. Optical microelectromechanical structure (MEMS) according to claim 10, wherein said plurality of layer structures comprise columns.

12. Optical microelectromechanical structure (MEMS) according to any of the claims 1-11, wherein said device layer (DL) is attached to a base layer (BL)

13. Optical microelectromechanical structure (MEMS) according to any of the claims 1-12, wherein the extent of said shortest individual optical paths (OP) between the optically transmissive layer (UTL) and the device layer substantially equals the thickness of said intermediate layer.

14. Optical microelectromechanical structure (MEMS) according to any of the claims 1-13, wherein the extent of the said shortest individual optical paths (OP) between the optically transmissive layer (UTL) and the base layer (BL) substantially equals

the thickness of the combined intermediate layer structure and said device layer in combination.

15. Optical microelectromechanical structure (MEMS) according to any of the claims 1-14, wherein said base layer (BL) is optically transmissive.

16. Optical microelectromechanical structure (MEMS) according to any of the claims 1-15, wherein said base layer (BL) is optically non-transmissive and provided with through-holes.

17. Optical microelectromechanical structure (MEMS) according to any of the claims 1-16, wherein said base layer (BL) comprises further apertures corresponding to said apertures (AP) and providing a corresponding number of optical paths (OP)

18. Optical microelectromechanical structure (MEMS) according to any of the claims 1-17, wherein said device layer (DL) comprises movable parts of actuators.

19. Optical microelectromechanical structure (MEMS) according to any of the claims 1-18, wherein said intermediate layer structure (IL) comprises at least two separated mutually joined layers, at least one of said mutually joined layers comprising an electrically insulating layer (22) and at least one of said mutually joined layers comprising a further layer (21).

20. Optical microelectromechanical structure (MEMS) according to any of the claims 1-19, wherein said intermediate layer structure (IL) comprises a handle layer (21) and an insulating layer (22) of a SOI wafer.

21. Optical microelectromechanical structure (MEMS) according to any of the claims 1-20, wherein said microelectromechanical structure (MEMS) comprises a sealed package.

22. Optical microelectromechanical structure (MEMS) according to any of the claims 1-21, and where the sealing is partly comprised by said optically transmissive layers.

23. Optical microelectromechanical structure (MEMS) according to any of the claims 1-22, wherein said transmissive layer (UTL) comprises micro lenses.

24. Optical microelectromechanical structure (MEMS) according to any of the claims 1-23, wherein said base layer (BL) comprises micro lenses.

25. Optical microelectromechanical structure (MEMS) according to any of the claims 1-24, wherein said layers are mutually joined.

26. Optical microelectromechanical structure (MEMS) according to any of the claims 1-25, wherein the layers of the microelectromechanical structure (MEMS) are plane layers.

27. Optical microelectromechanical structure (MEMS) according to any of the claims 1-26, wherein said intermediate layer structure comprises silicon oxide, silica, quartz, glass, aluminum, sapphire, silicon, nickel or other metals, PMMA or other polymers and/or combinations thereof.

28. Optical microelectromechanical structure (MEMS) according to any of the claims 1-27, wherein at least one of the optically transmissive layers preferably comprises Pyrex glass, quartz, silica, aluminum, sapphire, silicon, PMMA or other polymers and/or combinations thereof.

29. Optical microelectromechanical structure (MEMS) according to any of the claims 1-28, wherein said device layer (DL) comprises silicon of any doping, nickel or other metals or preferably silicon of high doping level.

30. Optical microelectromechanical structure (MEMS) according to any of the claims 1-29, wherein said insulating layer comprises silica, quartz, glass, aluminum, sapphire, silicon nitride, PMMA or other polymers preferably silicon oxide and/or combinations thereof.

31. Optical microelectromechanical structure (MEMS) according to any of the claims 1-30, wherein optical MEMS device comprises at least one light modulator arrangement, preferably formed in said device layer (DL), said at least one light modulator arrangement comprising at least one movable microshutter having at least one open and at least one closed position, where said at least one optical path guides light through the optical MEMS device via said at least one light modulator arrangement, and where the MEMS device further comprises electrical connections adapted for transmission of electrical control signal to and optionally from said at least one light modulator arrangement.

32. Optical microelectromechanical structure (MEMS) according to any of the claims 1-31, wherein the light transmitted in the at least one optical path (OP) is focused in or in the vicinity of the shutter plane of said at least one light modulator.

33. Method of manufacturing an optical microelectromechanical structure (MEMS) on the basis of at least

- an (at least one) optically transmissive layer (UTL)
- an (at least one) intermediate layer structure (IL)
- a (at least one) device layer (DL)

whereby optical transmission is facilitated between said optically transmissive layer (UTL) and said device layer (DL) by removal of at least a part of the intermediate layer structure (IL) and whereby the distance between said transmissive layer (UTL) and said device layer (DL) is defined by the thickness of said intermediate layer structure.

34. Method of manufacturing an optical microelectromechanical structure (MEMS) according to claim 33,
whereby structural parts of the MEMS device are formed by etching of said device layer (DL).

35. Method of manufacturing an optical microelectromechanical structure (MEMS) according to claim 33 or 34, whereby said intermediate layer structure (IL) comprising at least one electrically insulating layer,

whereby structural parts of the MEMS device is formed by etching of said device layer (DL) and whereby a lossless transmission of light is facilitated between said optically transmissive layer (UTL) and said device layer (DL) by removal of at least a part of said intermediate layer structure (IL).

36. Method of manufacturing an optical microelectromechanical structure (MEMS) according to claim 33 or 34, whereby said intermediate layer structure (IL) comprising at least one electrically insulating layer,

whereby structural parts of the optical MEMS device is formed by etching of said device layer (DL) and whereby at least one optical path is provided in said optically transmissive layer (UTL) and said device layer (DL) by partly removal of said intermediate layer structure (IL).

37. Method of manufacturing an optical microelectromechanical structure (MEMS) according to any of the claims 33-36, whereby said removal is performed by etching of the intermediate layer structure (IL).

38. Method of manufacturing an optical microelectromechanical structure (MEMS) according to any of the claims 33-37, whereby said optical MEMS layers are mutually joined.

39. Method of manufacturing an optical microelectromechanical structure (MEMS) according to any of the claims 33-38, whereby said optical MEMS device is a device according to any of the claims 1-32.

5